

Serial No. 10/533,650

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re **PATENT** application of:

Applicant: Haruo WAKAYAMA

Serial No.: 10/533,650 Art Unit: 3724

Filed: May 5, 2005

Title: **SCRIBE LINE FORMING DEVICE AND SCRIBE LINE FORMING METHOD**

Examiner: Sean M. Michalski

Docket No.: YAMAP0979US

**APPEAL BRIEF**

Mail Stop: Appeal Brief - Patents  
Commissioner for Patents  
U.S. Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This brief is submitted in connection with the appeal of the above-identified application. Credit card payment of the fee set forth in 37 C.F.R. § 41.20(b)(2) is made in connection herewith. If there are any additional fees resulting from this communication, please charge the same to our Deposit Account No. 18-0988, our Docket No. YAMAP0979US.

**I. Real Party in Interest**

The real party in interest in the present appeal is Mitsubishi Diamond Industrial Co., Ltd., assignee of the present application.

**II. Related Appeals and Interferences**

Appellant, Appellant's undersigned representative, and/or the assignee of the present application are unaware of any prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by, or have bearing on the Board's decision in the pending appeal.

**III. Status of Claims**

Claims 1, 5, and 14-16 are in the instant proceeding and are pending in the application. Claims 1, 5, and 14-16 stand finally rejected and are the subject of this appeal. Claims 2-4, 6-13, and 17-18 have been previously withdrawn.

**IV. Status of Amendments**

Claims 1 and 14 have been amended subsequent to the final rejection contained in the Final Office Action dated September 8, 2008. The amendments restored the claims to a previous version and were entered by the Examiner for purposes of the appeal. (See Advisory Action dated November 13, 2008.) No amendments to the specification have been made since the Final Office Action.

**V. Summary of the Claimed Subject Matter**

Independent claim 1 recites scribe line forming apparatus (page 7, lines 21-24; Figs. 1 and 2) comprising a vertical crack forming member that has a blade at a tip thereof and is used for forming a vertical crack to be an origination point of a scribe line by pressing the blade against a surface of a brittle substrate with pressure (page 9, lines 1-19); an impact force applying means for applying an abrupt impact force to the vertical crack forming member in order to generate the vertical crack having a predetermined depth at a desired position in the brittle substrate (page 9, line 20 to

page 10, line 22; page 19, line 26 to page 20, line 9); a heating means (page 11, lines 10-20) for forming an area having a temperature lower than a softening point of the brittle substrate (page 17, lines 4-11); a cooling means for cooling the brittle substrate (page 10, line 23 to page 11, line 9); an arrangement movement means for arranging the heating means, the vertical crack forming member, the impact force applying means, and the cooling means to be positioned so as to move relative to the brittle substrate at predetermined intervals along a planned scribe line that is prearranged on the surface of the brittle substrate (page 11, line 21 to page 12, line 1; page 22, lines 8-11); and a control unit (page 12, lines 2-14) that controls driving of the impact force applying means (page 15, lines 3-19). (See generally page 3, line 24 to page 4, line 13.)

Dependent claim 5 recites the scribe line forming apparatus according to claim 1, wherein the arrangement movement means either arranges the vertical crack forming member, and the heating means, and the cooling means to be positioned in the stated order from a fore side of the planned scribe line (page 5, lines 7-10; page 13, line 26 to page 14, line 9), or arrange the heating means, the vertical crack forming member, and the cooling means to be positioned in the stated order from the fore side of the planned scribe line (page 5, lines 10-13; page 13, line 26 to page 14, line 9).

Independent claim 14 recites a scribe line forming method comprising the steps of: while making a vertical crack forming member having a blade at a tip thereof move on a brittle substrate, generating a vertical crack having a predetermined depth at a desired position on a brittle substrate with an impact force applying means that applies an abrupt impact force to the blade (page 9, line 20 to page 10, line 22; page 19, line 26 to page 20, line 9); and forming a scribe line by forming, with the vertical crack, an irradiation area that has a temperature lower than a softening point of the brittle substrate along a planned scribe line arranged on the brittle substrate (page 17, lines 4-11), and forming a cooling area in rear of the irradiation area (page 17, lines 12-20). (See generally page 6, lines 9-19.)

Dependent claim 15 recites the scribe line forming method according to claim 14, wherein the generating step of generating the vertical crack having the predetermined depth at the desired position on the brittle substrate by the impact force applying means is performed when the blade is positioned in the vicinity of an edge of the brittle substrate (page 6, lines 20-24; page 15, lines 3-6 and 20-22) and in the vicinity of an intersection position at which the blade intersects a previously-formed scribe line (page 6, lines 24-26; page 18, line 3 to page 19, line 20).

Dependent claim 16 recites the scribe line forming method according to claim 14, wherein the vertical crack is formed at a position slightly inside from an edge of the substrate (page 26, lines 20-26).

#### **VI. Grounds of Rejection to be Reviewed on Appeal**

Claims 1, 5, and 14-16 stand rejected pursuant to 35 U.S.C. § 103(a) as being obvious over Hoekstra et al. U.S. Patent No. 6,489,588 (Hoekstra) in view of Ishikawa et al., U.S. Patent No. 6,536,121 (Ishikawa). Claims 1, 5, and 14-16 also stand rejected pursuant to 35 U.S.C. § 103(a) as being obvious over Hoekstra in view of Insolio, U.S. Patent No. 3,276,302 (Insolio).

#### **VII. Argument**

The claimed invention is a scribe line forming apparatus and related method. Aspects of the invention, as recited in claim 1 for example, include a vertical crack forming member, an impact force applying means, and heating and cooling means. The vertical crack forming member has a blade that forms a vertical crack to be an origination point of a scribe line by pressing the blade against the surface of a brittle substrate. The impact force applying means applies an abrupt impact force to the vertical crack forming member to generate the vertical crack. The scribe line is formed originating from this initial crack as a result of stresses generated by a temperature gradient created by the heating and cooling means. Comparable features are recited in independent method claim 14.

As further explained below, the references cited by the Examiner do not disclose or suggest at least the claimed impact force applying means for applying an abrupt impact force to the vertical crack forming member.

**A. Rejections Based On Hoekstra and Ishikawa**

Claims 1, 5, and 14-16 stand rejected pursuant to 35 U.S.C. § 103(a) as being obvious over Hoekstra et al. U.S. Patent No. 6,489,588 (Hoekstra) in view of Ishikawa et al., U.S. Patent No. 6,536,121 (Ishikawa). The device of Hoekstra has a microcrack initiator 60 having a scribe wheel 62, a heating means 41 (a mirror that reflects a laser beam), and a cooling means 50 (a quenching device). The Examiner equates these features with the claimed vertical crack forming member, heating means, and cooling means respectively. The Examiner recognizes that Hoekstra does not disclose an impact force applying means. The Examiner, however, concludes that Ishikawa discloses an impact force applying means, and that it would have been obvious to combine the impact force applying means of Ishikawa with the scribing apparatus of Hoekstra to arrive at the claimed invention.

Appellant traverses the rejections for at least the following reasons.

**1. Ishikawa Does Not Disclose the Claimed Impact Force Applying Means**

Ishikawa discloses a purported improvement to a scribing apparatus that uses a vibrating cutting blade. The Examiner considers a vibrating cutter as disclosing an abrupt impact, viewing each vibration as an "abrupt impact." (See, e.g., Final Office Action at page 5.) The Examiner, however, mischaracterizes the nature of a vibrating scribing device. During scribing, **the cutter should never leave contact with the substrate**. As Ishikawa itself states:

The scribing apparatus has a vibration generation member generating a vibration in a scribe body, and the scribing apparatus vibrates the cutter disposed on a lower end of the scribe body. When the cutter stays in contact with the work surface, the scribe body vibrates **without changing a position of the cutter**. Therefore, a pressure applied to the work by the cutter vibrates periodically, and

a deep vertical cracks [sic] is generated on the work surface in a work thickness direction.

(Col. 1, lines 10-18, emphasis added.) Indeed, the purpose of the purported improvement of Ishikawa is to prevent the cutter from losing contact with the substrate as a result of the vibrations. Thus, in a vibration scribe, the vibrations alter the **force** of the cutter, not its **position**. Contrary to the Examiner's conclusion, therefore, each vibration cycle does not generate an "abrupt impact".

As indicated in the current application, the "abrupt impact" is an impact against the vertical crack forming member at the origination of the scribe line to prevent unwanted cracking, particularly at the edge of the substrate. (See, e.g., Application at page 15, lines 3-19.) Following this initial impact, a laser scribing process proceeds. The claimed invention is thus properly understood as a process that includes an initial abrupt impact against a vertical crack forming member to initiate scribing, followed by a scribing process that employs structures different from those that generate the initial abrupt impact. Note that subsequent to the abrupt impact against the vertical crack forming member, the vertical crack forming member is not involved in the scribing process (which is performed by the heating and cooling means).

The process of Ishikawa is merely a variation on scribing using mechanical vibrations, a known alternative to laser scribing. The nature of the vibrations is essentially uniform over the entire process. Ishikawa does not disclose any feature for providing an initial impact that differs from the remainder of the scribing process. Ishikawa, therefore, does not disclose providing an abrupt impact, followed by a scribing process that employs different structures from those applying the abrupt impact, as claimed. Accordingly, Ishikawa does not disclose the claimed impact force applying means.

In the Advisory Action, the Examiner states that an "abrupt impact" relates to force, not necessarily to contact, and therefore does not require a positional change. The Examiner then relies on the interpretive principle that claims are to be given their

“broadest **reasonable** interpretation” to conclude that the vibrating cutter of Ishikawa provides an abrupt impact. (See Advisory Action, section 2.) Relatedly, the Examiner argues that the device of Ishikawa is “capable” of providing an abrupt impact. (See Advisory Action, section 3.) The Examiner’s interpretation of “abrupt impact”, however, simply is not “reasonable” as required by the claim interpretation standard.

The Examiner provides no basis for his interpretation of “abrupt impact”. Under the plain meaning of the claim terms, an “impact” is the striking of one body against another. “Abrupt” means sudden or quick. (See, e.g., *Random House College Dictionary*, Revised Edition (1984).) The Examiner, therefore, is not applying a “reasonable” interpretation when he concludes that the cutter of Ishikawa may generate an “abrupt” impact without any corresponding change of position. In this vein, the claim recites that the impact force applying means is positioned to apply the abrupt impact to the vertical crack forming member, not the substrate. Ishikawa does not disclose any comparably configured structures.

## **2. One Skilled In the Art Would Not Combine Hoekstra and Ishikawa**

In addition, one skilled in the art would not combine the disclosures of Hoekstra and Ishikawa. The devices of Hoekstra and Ishikawa operate based upon different scribing technologies. Hoekstra (and the claimed invention) employ a combination of heating and cooling beams to create stresses to form the scribe line, and a cutter or blade is used merely to form an initial crack. Indeed, element 60 in Hoekstra is termed a “microcrack initiator”. In contrast, the device of Ishikawa does not employ heating and cooling beams at all, but scribes with the vibrating cutting blade itself. One skilled in the art, therefore, would not apply the teachings of Ishikawa to the device of Hoekstra, insofar as the two devices scribe using different scribing technologies. To combine the references as suggested by the Examiner would improperly result in a modification of the principle of operation of the device of Hoekstra. “If the proposed modification or combination of references would change the principle of operation of the prior art

invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." MPEP § 2143.01 (VI), *citing, In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

Referring to the Final Office Action, the Examiner's response to this argument is unclear, but apparently is based on a purported distinction between generating a "micro-crack" (as characterized in Hoekstra) versus a deeper "crack". (See Final Office Action at pages 8-9.) As to the claimed impact force applying means, however, the significance of the feature is not any purported adjustment to the depth of the crack. Rather, the issue is how the crack (whatever the specific depth) is initiated, particularly at the edge of the substrate. Because Ishikawa does not address specific issues associated with crack initiation, Ishikawa cannot be the basis for modifying Hoekstra to provide an abrupt impact to initiate the crack.

In the Advisory Action, the Examiner adds that one skilled in art would combine Ishikawa and Hoekstra because they are in the same field of endeavor, and that one skilled in art does not bind himself to nearby inventions just because they are slightly different. The Examiner's argument, however, misses the point because Appellant's argument goes beyond the mere indication that Hoekstra and Ishikawa employ different scribing technologies. Hoekstra and the claimed invention relate to the use heating and cooling beams to create stresses to form the scribe line. The claimed invention improves upon this type of scribing by providing a more effective manner of initiating the scribe line: employing an impact force applying means to apply an abrupt impact against a vertical crack forming member. Ishikawa does not address the issue of crack initiation at all. One skilled in the art, therefore, would not read Ishikawa as suggesting a manner of crack initiation in a heating/cooling scribing device.

For the foregoing reasons, a combination of Ishikawa and Hoekstra lacks, and does not disclose or suggest, at least the claimed impact force apply means. Accordingly, claims 1, 5, and 14-16, are not obvious over Hoekstra in view of Ishikawa, and the rejections should be withdrawn.



***B. Rejections Based On Hoekstra and Insolio***

Claims 1, 5, and 14-16 also stand rejected pursuant to 35 U.S.C. § 103(a) as being obvious over Hoekstra in view of Insolio, U.S. Patent No. 3,276,302 (Insolio). Similar to the above, the Examiner recognizes that Hoekstra does not disclose the impact force applying means. The Examiner, however, concludes that Insolio discloses an impact force applying means, and that it would have been obvious to combine the impact force applying means of Insolio with the scribing apparatus of Hoekstra to arrive at the claimed invention.

Appellant traverses the rejections because Insolio (like Ishikawa) does not disclose or suggested the claimed impact force applying means.

The Examiner characterizes the device of Insolio as a solenoid actuated cutting device, wherein the solenoid controls the pressure or force applied by the cutter. Springs 162 bias the carriage 130 (with the cutter) away from the engaged position. In operation, the solenoid and springs control the positioning of the cutter to place it gently adjacent the substrate, at which time a full cutting voltage may be instantly applied. (See, e.g., col. 3, lines 1-7; Figs. 7-9.)

The Examiner has interpreted the instant application of the full cutting voltage as an "abrupt impact". Appellant submits that the Examiner has mischaracterized Insolio. This portion of Insolio is concerned with an issue that the cutter and/or glass may be damaged either when the cutter first impacts the glass, or if the cutter contacts the glass prematurely while the solenoid is still extending the cutter to the full cutting depth. (See col. 14, lines 30-40.) To address these issues, carriage wheels 136 aid in positioning the cutter out in front of the edge of the glass. (See, e.g., Fig. 8.) A low voltage is applied to the solenoid to slowly extend the cutter into position, which reduces the likelihood of impact damage. Once in position, the full voltage is immediately applied. (Col. 16, lines 35-46.)

In other words, Insolio ***teaches away*** from providing an abrupt impact to initiate

the cutting process. The spring, solenoid, and carriage slowly position the cutter into the cutting position in front of and adjacent the substrate. The low voltage is then raised to the full voltage. By first applying the low voltage, an abrupt impact (and the potential for impact damage) is avoided. In addition, the “full voltage” is the cutting voltage that is maintained throughout the cutting process. There is, therefore, no sudden and quick “abrupt impact” followed by a scribing process that employs structures different from those applying the abrupt impact, as in the claimed invention.

Similar to the above with respect to Ishikawa, in the Advisory Action the Examiner purports to apply the “broadest **reasonable** interpretation” of “abrupt impact” to Insolio by regarding the application of the cutting voltage as an “abrupt impact”. Again, the Examiner provides no basis for his interpretation, which is contrary to the plain meaning of “impact”, set forth above, as the striking of one body against another. In Insolio, nothing strikes the cutter, which differs from the claimed invention in which the impact force applying means applies an abrupt impact to the vertical crack forming member. Once more, the Examiner’s interpretation of abrupt impact simply is not reasonable as required by even the purportedly broad standards of claim interpretation.

For the foregoing reasons, a combination of Insolio and Hoekstra lacks, and does not disclose or suggest, at least the claimed impact force apply means. Accordingly, claims 1, 5, and 14-16, are not obvious over Hoekstra in view of Insolio, and the rejections should be withdrawn.

### **C. Conclusion**

For at least these reasons, claims 1, 5, and 14-16 are not obvious over Hoekstra in view of Ishikawa. The claims also are not obvious over Hoekstra in view of Insolio. Accordingly, Appellant respectfully requests reversal of the Examiner’s rejections of claims 1, 5, and 14-16.

**VII. Claims Appendix**

An appendix containing a copy of the claims involved in this appeal is attached to this brief.

**IX. Evidence Appendix**

An evidence appendix is attached, but identifies no items of evidence.

**X. Related Proceedings Appendix**

A related proceedings appendix is attached, but identifies no decisions.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, LLP

/Mark D. Saralino/  
Mark D. Saralino  
Reg. No. 34,243

DATE: December 5, 2008

The Keith Building  
1621 Euclid Avenue  
Nineteenth Floor  
Cleveland, Ohio 44115  
(216) 621-1113

**CLAIMS APPENDIX**

1. A scribe line forming apparatus comprising:

a vertical crack forming member that has a blade at a tip thereof and is used for forming a vertical crack to be an origination point of a scribe line by pressing the blade against a surface of a brittle substrate with pressure;

an impact force applying means for applying an abrupt impact force to the vertical crack forming member in order to generate the vertical crack having a predetermined depth at a desired position in the brittle substrate;

a heating means for forming an area having a temperature lower than a softening point of the brittle substrate;

a cooling means for cooling the brittle substrate;

an arrangement movement means for arranging the heating means, the vertical crack forming member, the impact force applying means, and the cooling means to be positioned so as to move relative to the brittle substrate at predetermined intervals along a planned scribe line that is prearranged on the surface of the brittle substrate;  
and

a control unit that controls driving of the impact force applying means.

5. The scribe line forming apparatus according to Claim 1, wherein

the arrangement movement means either arranges the vertical crack forming member, and the heating means, and the cooling means to be positioned in the stated order from a fore side of the planned scribe line, or arrange the heating means, the vertical crack forming member, and the cooling means to be positioned in the stated order from the fore side of the planned scribe line.

14. A scribe line forming method comprising the steps of:

while making a vertical crack forming member having a blade at a tip thereof move on a brittle substrate, generating a vertical crack having a predetermined depth at a desired position on a brittle substrate with an impact force applying means that applies an abrupt impact force to the blade;

forming a scribe line by forming, with the vertical crack, an irradiation area that has a temperature lower than a softening point of the brittle substrate along a planned scribe line arranged on the brittle substrate, and forming a cooling area in rear of the irradiation area.

15. The scribe line forming method according to Claim 14, wherein

the generating step of generating the vertical crack having the predetermined depth at the desired position on the brittle substrate by the impact force applying means is performed when the blade is positioned in the vicinity of an edge of the brittle substrate and in the vicinity of an intersection position at which the blade intersects a previously-formed scribe line.

16. The scribe line forming method according to claim 14, wherein the vertical crack is formed at a position slightly inside from an edge of the substrate.

**EVIDENCE APPENDIX**

None.

**RELATED PROCEEDINGS APPENDIX**

None.